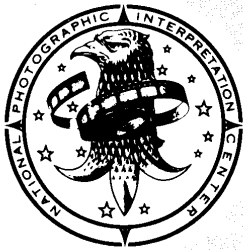


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PHOTOGRAPHIC
INTERPRETATION
REPORT

NATIONAL PHOTOGRAPHIC
INTERPRETATION CENTER

MICROWAVE RADIO RELAY FACILITIES IN SOUTH AFRICA (TSR)

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USIBONLY-	USIB Departments Only
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MICROWAVE RADIO RELAY FACILITIES IN SOUTH AFRICA (TSR)

1. (TSR) An extensive microwave radio relay network has been identified in South Africa (Figure 1) as a result of a search  This photography, which was the best available, covered approximately 70 to 80 percent of South Africa. The microwave network consists of at least 63 microwave radio relay communications facilities.  of three facilities identified during the search permitted detailed measurement of a representative sample of those microwave radio relay facilities. The facilities observed  are shown in Figures 2 through 4. Table 1 lists the dimensions and other information pertinent to all the facilities identified in the search. The small scale of the search photography in most instances precluded the determination of antenna orientations. Because multiple look-angles were available at only one facility (Figure 3), one or more antennas were probably hidden from view on most towers.

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2. (TSR) All microwave radio relay antennas identified in the search were parabolic dishes, and those which could be measured  No horn-type, microwave radio relay antennas were identified.

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3. (TSR) The microwave radio relay facilities in South Africa can be categorized into three distinct types based on the relay towers. One type (Figure 2) consists of a fence-secured, self-supporting lattice tower with a control building underneath or beside the tower and one or more parabolic dish antennas. A second type (Figure 3) consists of a fence-secured masonry tower with a control building contained inside the tower base and one or more parabolic dish antennas mounted on the sides of the tower. A parapet, which may be used as an observation point, is at the top of this type of tower. The third type (Figure 4) consists of a fence-secured, guyed vertical radiator for radio communications, a control/tuning building at the base of the vertical radiator, and one or more parabolic dish antennas. The diameter of the antennas at this type could not be determined from the available photography.

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Table 1. Data on Microwave Radio-Relay Facilities Identified in South Africa (Keyed to Figure 1)
This table in its entirety is classified TOP SECRET RUFF

Microwave Radrel Site No	Geographic Coordinates	Approx Site Elevation (ft)	Tower Type	Tower Height (meters)	Microwave Radio-Relay Antenna type*	Antenna Height on Tower (meters)*	Microwave Radrel Site No	Geographic Coordinates	Approx Site Elevation (ft)	Tower Type	Tower Height (meters)	Microwave Radio-Relay Antenna type*	Antenna Height on Tower (meters)*
1	23-38-43S 027-57-36E	3,800	Lattice	66	Undet	--	34	27-56-25S 029-58-22E	4,750	Lattice	40	Parabolic dish	17
2	24-06-18S 029-11-46E	5,665	Lattice	61	Undet	--	35	29-06-55S 026-14-26E	5,550	Lattice	38	Parabolic dish	23
3	23-47-48S 029-59-56E	5,904	Vertical radiator	66	Undet	--						Parabolic dish	38
4	24-29-16S 027-42-49E	6,055	Lattice	62	Undet	--						Parabolic dish	38
5	25-18-29S 026-41-44E	4,765	Lattice	62	Undet	--						Parabolic dish	38
6	25-51-50S 026-03-01E	5,000	Vertical radiator	247	Parabolic dish	173	36	29-53-56S 027-49-39E	5,500	Masonry	34	Undet	--
7	25-57-13S 026-42-22E	5,683	Lattice	36	Undet	--	37	28-14-49S 028-27-46E	5,990	Vertical radiator	178	Undet	--
8	25-48-47S 028-30-17E	5,182	Lattice	81	Undet	--	38	26-09-41S 029-58-44E	6,089	Lattice	44	Undet	--
9	25-36-09S 028-57-27E	5,551	Lattice	36	Undet	--	39	28-08-41S 030-12-37E	5,220	Lattice	55	Parabolic dish	36
10	25-53-16S 029-58-03E	5,000	Lattice	255	Parabolic dish	Undet	40	28-52-07S 031-17-01E	3,408	Vertical radiator	165	Parabolic dish	46
11 (see Fig 2)	25-49-52S 029-22-41E	6,089	Lattice	159	Parabolic dish	Undet	41	29-46-56S 030-43-14E	3,572	Lattice	55	Undet	--
					Parabolic dish	36						Undet	--
					Parabolic dish	36	42	29-55-46S 029-51-13E	5,600	Vertical radiator	147	Undet	--
12	26-13-02S 027-54-59E	6,120	Vertical radiator	42	Undet	--	43 (Lesotho)	30-27-12S 027-59-37E	8,000	Vertical radiator	195	Undet	--
13	26-25-25S 026-13-38E	5,000	Masonry	37	Parabolic dish	42	44	29-51-56S 025-57-22E	5,115	Lattice	68	Parabolic dish	68
14	26-39-33S 026-29-12E	5,217	Masonry	29	Parabolic dish	29	45	29-51-56S 023-28-33E	4,312	Masonry	36	Undet	--
15	26-46-25S 026-23-21E	5,000	Vertical radiator	26	Undet	--	46	30-21-01S 023-35-28E	4,112	Masonry	36	Undet	--
16	26-51-30S 026-35-00E	4,200	Masonry	32	Parabolic dish	7	47	30-44-21S 023-28-33E	4,412	Masonry	35	Parabolic dish	35
17	26-46-37S 026-58-00E	4,858	Lattice	57	Undet	--	48	28-49-30S 022-02-24E	3,410	Masonry	35	Parabolic dish	35
18	26-49-13S 027-29-00E	5,557	Lattice	63	Undet	--	49	28-52-39S 021-43-34E	4,801	Lattice	58	Parabolic dish	Undet
19	26-58-20S 029-12-21E	5,600	Lattice	173	Parabolic dish	Undet	50	29-09-02S 021-21-17E	3,000	Lattice	81	Undet	--
20	27-19-20S 029-53-09E	6,720	Vertical radiator	--	Undet	--	51	29-32-29S 020-46-28E	3,000	Lattice	107	Undet	--
21 (ucon)	28-14-54S 020-22-46E	2,990	Prob masonry	--	--	--	52	29-46-24S 020-22-29E	3,000	Lattice	84	Undet	--
22 (see Fig 3)	28-18-00S 021-15-00E	3,000	Masonry	27	Parabolic dish**	27	53	30-22-17S 020-20-52E	3,000	Masonry	34	Undet	--
23	28-28-49S 021-36-37E	3,500	Masonry	18	Parabolic dish	18	54	32-35-33S 022-16-52E	2,500	Masonry	33	Undet	--
24	28-44-48S 021-59-42E	3,000	Lattice	22	Undet	--	55	32-08-28S 025-38-40E	3,285	Masonry	23	Parabolic dish	21
25	28-40-15S 022-09-04E	4,300	Lattice	22	Undet	--	56	32-42-17S 025-48-50E	3,285	Lattice	21	Parabolic dish	Undet
26	28-43-30S 022-28-55E	5,300	Masonry	25	Parabolic dish	19						Parabolic dish	21
27	28-04-52S 022-41-46E	5,019	Lattice	39	Undet	--	57	32-17-01S 028-12-27E	1,750	Vertical radiator	241	Undet	--
28	28-40-41S 023-11-16E	5,272	Masonry	48	Parabolic dish	Undet	58 (see Fig 4)	27-50-30S 021-35-42E	3,000	Vertical radiator	147	Prob parabolic dish	--
29	28-48-20S 023-38-40E	4,500	Masonry	63	Parabolic dish	Undet	59	32-38-41S 026-02-51E	4,970	Vertical radiator	147	Undet	--
30	28-49-18S 024-23-47E	3,769	Masonry	63	Parabolic dish	Undet	60	32-26-16S 026-39-07E	5,250	Masonry	44	Undet	--
31	28-09-52S 025-12-03E	4,334	Masonry	50	Undet	--	61	32-41-35S 027-16-10E	4,660	Vertical radiator	180	Undet	--
32	28-57-44S 025-42-24E	4,300	Lattice	264	Parabolic dish	Undet	62	23-41-13S 029-35-59E	4,592	Masonry	24	Undet	--
33	28-10-54S 026-32-00E	5,327	Vertical radiator	243	Parabolic dish	243	63	23-59-45S 029-28-27E	4,592	Vertical radiator	Undet	Undet	--

* One or more antennas were probably hidden from view.

** Multiple look-angles verified the presence of only one antenna.

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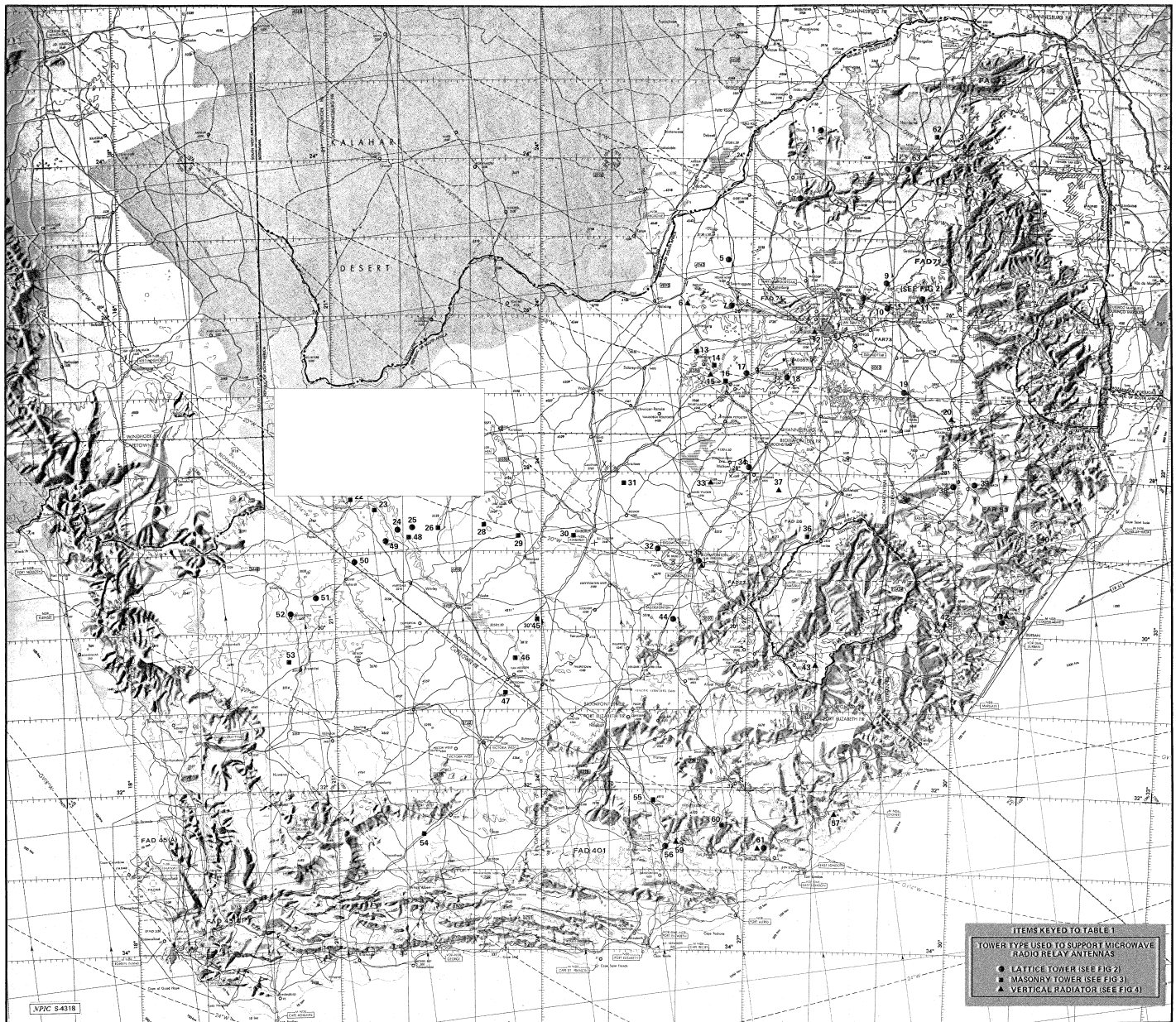


FIGURE 1. LOCATIONS OF MICROWAVE RADIO RELAY FACILITIES IN SOUTH AFRICA

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List of Conversion Factors by Classification

UNITS OF LENGTH

<i>IF YOU HAVE</i>	<i>MULTIPLY BY</i>	<i>TO OBTAIN</i>
MILLIMETERS	0.0394	INCHES
CENTIMETERS	0.3937	INCHES
INCHES	25.4000	MILLIMETERS
INCHES	2.5400	CENTIMETERS
FEET	0.3048	METERS
FEET	0.0003	KILOMETERS
YARDS	0.9144	METERS
METERS	3.2808	FEET
METERS	0.0005	MILES(NAUTICAL)
METERS	1.0936	YARDS
KILOMETERS	3280.8400	FEET
KILOMETERS	0.6214	MILES(STATUTE)
KILOMETERS	0.5400	MILES(NAUTICAL)
MILES(STATUTE)	1.6093	KILOMETERS
MILES(NAUTICAL)	6076.1154	FEET
MILES(NAUTICAL)	1.8520	KILOMETERS
MILES(NAUTICAL)	1852.0000	METERS

UNITS OF MASS

<i>IF YOU HAVE</i>	<i>MULTIPLY BY</i>	<i>TO OBTAIN</i>
KILOGRAMS	2.2046	POUNDS(AVOIR.)
POUNDS(AVOIR.)	0.4536	KILOGRAMS
SHORT TONS	0.9072	METRIC TONS
METRIC TONS	1.1023	SHORT TONS
METRIC TONS	0.9842	LONG TONS
LONG TONS	1.0160	METRIC TONS

UNITS OF VOLUME

<i>IF YOU HAVE</i>	<i>MULTIPLY BY</i>	<i>TO OBTAIN</i>
LITERS	0.2642	GALLONS
LITERS	0.0063	BARRELS(POL)
LITERS	0.0010	CUBIC METERS
GALLONS	3.7854	LITERS
GALLONS	0.1337	CUBIC FEET
GALLONS	0.0238	BARRELS(POL)
GALLONS	0.0038	CUBIC METERS
BUSHELS	0.0352	CUBIC METERS
CUBIC FEET	7.4805	GALLONS
CUBIC FEET	0.1781	BARRELS(POL)
CUBIC FEET	0.0283	CUBIC METERS
CUBIC YARDS	0.7646	CUBIC METERS
BARRELS(POL)	158.9873	LITERS
BARRELS(POL)	42.0000	GALLONS
BARRELS(POL)	5.6146	CUBIC FEET
BARRELS(POL)	0.1590	CUBIC METERS
CUBIC METERS	1000.0000	LITERS
CUBIC METERS	264.1721	GALLONS
CUBIC METERS	35.3147	CUBIC FEET
CUBIC METERS	28.3776	BUSHELS
CUBIC METERS	6.2898	BARRELS(POL)
CUBIC METERS	1.3080	CUBIC YARDS

UNITS OF AREA

<i>IF YOU HAVE</i>	<i>MULTIPLY BY</i>	<i>TO OBTAIN</i>
SQUARE CENTIMETERS	0.1550	SQUARE INCHES
SQUARE INCHES	6.4516	SQUARE CENTIMETERS
SQUARE FEET	0.0929	SQUARE METERS
SQUARE YARDS	0.8361	SQUARE METERS
SQUARE METERS	10.7639	SQUARE FEET
SQUARE METERS	1.1960	SQUARE YARDS
SQUARE METERS	1.0000	CENTARES
SQUARE METERS	0.0002	ACRES
SQUARE METERS	0.0001	HECTARES
ACRES	4046.8564	SQUARE METERS
ACRES	0.4047	HECTARES
HECTARES	10000.0000	SQUARE METERS
HECTARES	2.4711	ACRES

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